FLAGSTAFF ENGINEERING

CP/M System File Conversion Programs

CP/M SYSTEMS CONVERSION
DOCUMENTATION
8860-CPM
SERIAL# CPM-132

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USER'S MANUAL

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INTRODUCTION

The File Connection from Flagstaff Engineering consists of separate file conversion program packages for use with The Flagstaff Engineering Diskette Connection 8" diskette drive system for the IBM PC/XT/AT. File Connection packages allow the user to exchange data files between the IBM PC/XT/AT and other systems that use 8" diskettes.

Systems supported by File Connection packages include IBM Host Exchange diskettes, CP/M, Digital Equipment, Allen-Bradley Numerical Control, Rolm, Honeywell, Intel ISIS, and others.

PROGRAM NAMING CONVENTIONS

File Connection program names use specific abbreviations to indicate function and system type.

System abbreviations are;

IBM	IBM Host Exchange formats .
IBI	IBM System/9000
DMA	IBM System/23 Datamaster.
EDX	IBM Series/1.
P36	IBM 5364 Desktop System/36
CPM	CP/M Systems.
DEC	Digital Equipment Systems.
DGE	Data General RDOS Systems.
ISS	Intel ISIS systems.
TRS	Tandy Radio Shack Model II
ALB	Allen Bradley Numerical Control.

Function abbreviations are:

XXXFMT	Format a diskette with specific file exchange parameters.
XXX8TO5	Transfer files from an 8 inch diskette to a PC-DOS volume.
XXX5TO8	Transfer files from a DOS volume to an 8 inch diskette.
XXXTOYYY	Transfer files from system format XXX to system format YYY.

SYSTEM REQUIREMENTS

The File Connection requires the following minimum system configuration:

1. IBM PC, PC/XT, or PC/AT computer.

2. Flagstaff Engineering "DISKETTE CONNECTION" 8 inch diskette drive system. Hard sector diskette conversion packages require either a Model D or Model S diskette controller card with the hard sector option installed. 5 1/4" high density diskette packages require a Flagstaff Engineering High Density external 5 1/4" drive, or an IBM PC/AT with internal 5 1/4" high density drive installed.

3. Flagstaff Engineering "DISKETTE CONNECTION" I/O device driver. (See the System Installation Guide and Diagnostic and Utility Manual for more information.)

PROGRAM OPERATION

File Connection programs may be copied to and executed from any PC-DOS diskette or hard disk volume desired.

To load File Connection programs, use the standard PC-DOS load command syntax:

```
A:PROGRAM NAME
```

When Word Connection programs are loaded, a message is displayed that contains the copyright date. New program versions are released periodically, and this date is used to keep track of program updates.

In the program operation sections of the manual, keyboard entries are indicated by bracketed characters.

[ENTER] equals the enter key.
[Y] equals the Y key.

File Connection programs may be aborted by pressing [CTRL] [C]. Occasionally, the Control-C sequence may not successfully terminate the program. If this occurs, press [CTRL] [BREAK] to end the program. Exiting programs through the use of [CTRL] [C] and [CTRL] [BREAK] is not recommended, and should be used with discretion.

Program prompts require key entries followed by the [ENTER] key. If the [ENTER] key is pressed without typing a character, the program will default to the first option displayed by the prompt.

Program prompts for key entries are issued by the programs in the forms:

(DEFAULT/RANGE OF ENTRIES) and
(DEFAULT/OPTION1,OPTION2,OPTION3)

At the prompt, "ENTER DRIVE NUMBER (1/2-4)?", pressing the [ENTER] key will select the default entry of [1]. Optional values may be entered by pressing [2], [3], or [4] followed by the [ENTER] key.

Many File Connection programs prompt for an optional translation table file name. The default is always an internal table built into the program.

An external translation table consists of a 256 byte lookup table where the value of a given character in the source file is used to point to a position in the table. The value stored in the specific position in the table will be used as the translated character in the output files.

An example would be an ASCII hex value of '20' (ASCII space). If a table was created to translate ASCII to a target character set, the value found at position '20' in the table would be written to the output file every time the program found an ASCII space character in the input file.

DOCUMENTATION FORMAT

File Connection program descriptions are are presented in the following format in the program description section of the manual:

1. Program Name.
2. Use.
3. Miscellaneous Notes.
4. Description.
5. Operation.
6. Defaults.
7. Destructive/Nondestructive
8. Sample Program Run

CPM8T05

USE:

Copy a data file from an 8" CP/M diskette to a PC-DOS file.

DESCRIPTION:

The CPM8T05 program is designed to copy data files from 8" CP/M format diskettes to PC-DOS files. The first operation that the program performs is a diskette format check. The program will identify the number of sides, density type, and sector size of the 8" diskette and display the information.

Since the program can be ended after this display, CPM8T05 functions as a utility program to identify diskette formats. If the program cannot identify the 8" diskette format, a message will be displayed that says the diskette cannot be copied.

The program requires that the user enter several CP/M diskette parameters to determine the logical layout of the diskette. These parameters are:

1. Skew Factor
2. CP/M directory Cylinder
3. CP/M Records Per Block
4. CP/M Blocks In Directory

These parameters are described in the section on CP/M Conversion Tips.

The program copies data files from the 8" diskette by file number.

The file pointers in the directory entries are used to located the data file. A single file may be copied or the entire diskette may be copied. Up to 256 files may be copied from the CP/M diskette.

The CP/M files will be written to DOS files as 128 byte records. The file name a specific CP/M file is written to will have the same file name and extension as displayed in the CP/M directory.

CPM8TO5 will copy an 8" file to any DOS volume, including a hard disk.

If the CP/M file name already exists on the DOS volume, the DOS file will be deleted, and then recreated by the copy operation.

OPERATION:

Load CPM8TO5. On completion of the program load, a program description message will be displayed. The program will prompt the user to insert an 8" diskette into the drive, and enter the drive number of the unit selected.

Insert the 8" CP/M diskette into the drive and select the appropriate drive address by entering a [1] or [2], or select drive [1] by pressing [ENTER].

The program will display bytes per sector, density type, and number of sides of the 8" diskette. The program will then prompt the user for the CP/M sector skew factor.

Enter a skew factor from 1 to 16 or press [ENTER] to select a skew factor of 6.

The program will prompt the user for the CP/M directory cylinder.

Enter a cylinder number from 1 to 9, or press [ENTER] to select cylinder 1.

The program will prompt the user to enter the number of CP/M records per block.

Enter 8, 16, 32, or 64 records per block, or press [ENTER] to select 8 records per block.

The program will prompt the user to enter the number of blocks in the CP/M directory.

Enter a number from 1 to 9, or press [ENTER] to select 2 blocks in the directory.

The program will read the CP/M diskette directory and display a list of the directory entries as file names preceded by a file number. The program will prompt the user to enter the number of the file to be copied.

Enter a number from 1 to 256 to select the file to be copied. The user may also select to copy ALL files on the 8" diskette by entering a [999]. If the option to copy all files is selected, the program will prompt the user to enter the starting file number for the copy operation. This allows copying a range of files from file n to the last file.

If [ENTER] is pressed without entering a file number, the program will exit the copy operation and prompt the user to copy from another CP/M diskette. Another diskette can be loaded at this point, or the program can be ended by pressing [ENTER].

The program will copy the 8" CP/M file selected to the DOS volume that CPM8TO5 was loaded from. The program will then display a message that the copy is complete, the number of the file copied, and the number of records copied. The directory of the files on the 8" diskette will be displayed and the user will be prompted to select another file to copy.

Enter the file number to be copied, or press enter to exit the copy operation.

DEFAULTS:

Drive Number:	[ENTER] = Drive 1.
Skew Factor:	[ENTER] = 6
Directory Cylinder:	[ENTER] = 2
Records per Block	[ENTER] = 8
Directory Blocks:	[ENTER] = 2
File Number:	[ENTER] = Return to Enter Diskette prompt.
Continue Copy:	[ENTER] = End program.

DESTRUCTIVE/NONDESTRUCTIVE:

CPM8TO5 will not destroy data on the 8" source diskette, however, IF THE TARGET FILE NAME ALREADY EXISTS ON THE DOS VOLUME, ALL ORIGINAL DATA IN THE DOS FILE WILL BE DESTROYED BY THE COPY OPERATION.

SAMPLE RUN:

```
A>  [CPM8T05] [ENTER]

COPY 8" CP/M TO 5" DOS DISKETTE PROGRAM
COPYRIGHT FLAGSTAFF ENGINEERING 6/1/85

INSERT 8" CP/M DISKETTE -
ENTER DRIVE (1/2) WHEN READY.?  [ENTER]

DISKETTE IS 128 BYTE SECTOR - SINGLE
DENSITY - SINGLE SIDE

ENTER CP/M SECTOR SKEW
FACTOR (6/1-9)?  [ENTER]

ENTER CP/M DIRECTORY CYLINDER
NUMBER (2/1-9)?  [ENTER]

ENTER NUMBER OF CP/M RECORDS PER BLOCK
(8/16,32,64)?  [ENTER]

ENTER NUMBER OF CP/M BLOCKS IN
DIRECTORY (2/1-9)? [ENTER]

**DIRECTORY OF FILES ON 8" CP/M DISKETTE**
FILE  NAME       RECS  FILE NAME      RECS
001-TEST.ASM     0233  002-HELP.TXT   0074
003-ARCDATA.DBF  0132  004-HELP.BAK   0074

ENTER CP/M FILE FOR COPY (1-256/999=ALL) -
PRESS ENTER IF NONE? [999] [ENTER]

ENTER STARTING CP/M FILE NUMBER FOR COPY
ALL (1/1-256)? [3] [ENTER]

COPY OF #003 ARCDATA .DBF IS COMPLETED
 - 132 RECORDS WERE COPIED
COPY OF #004 HELP    .BAK IS COMPLETED
 - 74 RECORDS WERE COPIED
PRESS ENTER TO USE HDR1 NAME?  [ENTER]
```

```
**DIRECTORY OF FILES ON 8" CP/M DISKETTE**
FILE  NAME       RECS  FILE NAME      RECS
001-TEST.ASM     0233  002-HELP.TXT   0074
003-ARCDATA.DBF  0132  004-HELP.BAK   0074

ENTER CP/M FILE FOR COPY (1-256/999=ALL) -
PRESS ENTER IF NONE?  [ENTER]

DO YOU WANT TO COPY FROM
ANOTHER CP/M DISKETTE (N/Y)?  [ENTER]
A>
```

CPM5TO8

USE:

Copy a PC-DOS file to a CP/M 8" diskette.

DESCRIPTION:

The CPM5TO8 program is designed to copy DOS files from any valid DOS volume to a 8" CP/M diskette.

The program will identify and display the number of sides, density type, and sector size of the 8" diskette. If the 8" diskette format cannot be determined, the program will display a message stating the diskette cannot be copied.

The program copies a file from a DOS volume by file name. The eight character DOS file name will used as the file name in the CP/M directory entry on the 8" diskette.

An option is supported by the program to erase the 8" file directory after a copy operation has been completed. This option should be used to delete all old files from the CP/M diskette before copying to it.

OPERATION:

Load CPM5TO8. On completion of the program load, a program description message will be displayed. The program will then prompt the user to insert an 8" diskette into the drive, and enter the drive number of the unit selected.

Insert the 8" CP/M diskette into the drive and select the appropriate drive address by entering a [1] or [2], or select drive [1] by pressing [ENTER].

The program will display bytes per sector, density type, and number of sides of the 8" diskette. The program will then prompt the user for the CP/M sector skew factor.

Enter a skew factor from 1 to 16 or press [ENTER] to select a skew factor of 6.

The program will prompt the user for the CP/M directory cylinder.

Enter a cylinder number from 1 to 9, or press [ENTER] to select cylinder 1.

The program will prompt the user to enter the number of CP/M records per block.

Enter 8, 16, 32, or 64 records per block, or press [ENTER] to select 8 records per block.

The program will prompt the user to enter the number of blocks in the CP/M directory.

Enter a number from 1 to 9, or press [ENTER] to select 2 blocks in the directory.

The program will read the CP/M diskette directory and display a list of the directory entries as file names preceded by a file number.

The program will display a message indicating the file number and starting extent of any new file copied to the 8" diskette.

The program will prompt the user to erase the CP/M directory.

Press [N] or [ENTER] to continue the program, or [Y] to erase the directory. If the erase option is selected, all files on the CP/M diskette will be erased, so extreme caution should be used when selecting this option.

The user will then be prompted to enter the name of the DOS file to be copied.

Enter the DOS volume and file name in standard DOS syntax, i.e.,

VOL. ID:FILE NAME.EXT

If [ENTER] is pressed without typing a Vol. ID and file name, the program will exit the copy routine and prompt the user to exit the program or copy to another diskette.

The program will begin the copy operation and display an information line indicating write and read verify operations to Cylinder, Head, and Sector numbers of the 8" diskette. On completion of the copy operation, the program will display an information line indicating the copy is complete and the number of records copied.

The program will prompt the user to copy to another 8" diskette or exit the program.

Press [N] or [ENTER] to end the program, or press [Y] to copy another file or copy to a new 8" diskette.

DEFAULTS:

Drive Number:	[ENTER] = Drive 1.
Skew Factor:	[ENTER] = 6
Directory Cylinder:	[ENTER] = 2
Records per Block	[ENTER] = 8
Directory Blocks:	[ENTER] = 2
DOS File Name:	[ENTER] = Exit copy and prompt for new diskette.
Continue Copy:	[ENTER] = End program.

SAMPLE RUN:

```
A>CPM5TO8  [ENTER]

COPY 8" CP/M TO 5" DOS DISKETTE PROGRAM
COPYRIGHT FLAGSTAFF ENGINEERING 6/1/85

INSERT 8" CP/M DISKETTE -
ENTER DRIVE (1/2) WHEN READY.?  [ENTER]

DISKETTE IS 128 BYTE SECTOR - SINGLE
DENSITY - SINGLE SIDE

ENTER CP/M SECTOR SKEW
FACTOR (6/1-9)?  [ENTER]

ENTER CP/M DIRECTORY CYLINDER
NUMBER (2/1-9)?  [ENTER]

ENTER NUMBER OF CP/M RECORDS PER BLOCK
(8/16,32,64)?  [ENTER]

ENTER NUMBER OF CP/M BLOCKS IN
DIRECTORY (2/1-9)? [ENTER]
```

```
**DIRECTORY OF FILES ON 8" CP/M DISKETTE**
FILE  NAME        RECS  FILE NAME       RECS
001-TEST.ASM      0233  002-HELP.TXT    0074
003-ARCDATA.DBF 0132  004-HELP.BAK    0074
XXXX CP/M BLOCKS IS THE
TOTAL DISKETTE CAPACITY

NEW FILE WILL BE #05 STARTING AT
BLOCK XX ON THE 8" DISKETTE

DO YOU WANT TO ERASE THE 8" CP/M FILE
DIRECTORY (N/Y)  [ENTER]

ENTER DOS FILE NAME FOR COPY B:NAME.EXT -
PRESS ENTER IF NONE  [A:TESTFILE.DOC]

FILE COPY IS COMPLETED
XXXX RECORDS WERE COPIED

**DIRECTORY OF FILES ON 8" CP/M DISKETTE**
FILE  NAME         RECS  FILE NAME       RECS
001-TEST.ASM       0233  002-HELP.TXT    0074
003-ARCDATA.DBF   0132  004-HELP.BAK    0074
005-TESTFILE.DOC 0045
XXXX CP/M BLOCKS IS THE
TOTAL DISKETTE CAPACITY

NEW FILE WILL BE #06 STARTING AT
BLOCK XX ON THE 8" DISKETTE

DO YOU WANT TO ERASE THE 8" CP/M FILE
DIRECTORY (N/Y)  [ENTER]

ENTER DOS FILE NAME FOR COPY B:NAME.EXT -
PRESS ENTER IF NONE  [ENTER]

DO YOU WANT TO COPY TO ANOTHER CP/M
DISKETTE (N/Y)?  [ENTER]
C>
```

CPMTODOS

USE:

Copy a PC CP/M-86 5 1/4 inch diskette file to a PC-DOS file.

DESCRIPTION:

The CPMTODOS program is designed to copy CP/M-86 files to DOS files on PC/XT/AT systems that run both PC-DOS and CP/M-86. The files are copied as is without any type of conversion.

OPERATION:

Load CPMTODOS. On completion of the program load, a program description message will be displayed. The program will then prompt the user to insert the 5 1/4 inch CP/M-86 diskette into a drive and enter the DOS drive letter of the drive being used.

Insert the CP/M-86 diskette and press [A] for DOS drive A, or press [B] or [ENTER] to select DOS drive B.

The program will prompt the user to enter the DOS destination drive for the files to be copied to.

Enter a letter from A to G, or press [ENTER] to select DOS drive A.

The program will read the CP/M diskette directory and display a list of the directory entries as file names preceded by a file number. The program will prompt the user to enter the number of the file to be copied.

Enter a number from 1 to 64 to select the file to be copied. The user may also select to copy ALL files on the 8 inch diskette by entering a [99].

If [ENTER] is pressed without entering a file number, the program will exit the copy operation and prompt the user to copy from another CP/M diskette. Another diskette can be loaded at this point, or the program can be ended by pressing [ENTER].

The program will copy the CP/M-86 file to the DOS volume selected by the user. The program will then display a message that the copy is complete, the number of the file copied, and the number of records copied. The directory of the files on the CP/M-86 diskette will be displayed and the user will be prompted to select another file to copy.

Enter the file number to be copied, or press enter to exit the copy operation.

When the copy operation is ended, the program will prompt the user to copy from another CP/M diskette.

Press [Y] to copy from another diskette, or press [N] or enter to end the program.

DEFAULTS:

Drive Number:	[ENTER] = Drive B.
Destination Drive Number:	[ENTER] = Drive A.
File Number:	[ENTER] = Exit copy routine.
Continue Copy:	[ENTER] = End program.

DESTRUCTIVE/NONDESTRUCTIVE:

CPMTODOS will not destroy data on the CP/M-86source diskette, however, IF THE TARGET FILE NAME ALREADY EXISTS ON THE DOS VOLUME, ALL ORIGINAL DATA IN THE DOS FILE WILL BE DESTROYED BY THE COPY OPERATION.

SAMPLE RUN:

```
A>  [CPMTODOS] [ENTER]

COPY 5" CP/M TO 5" DOS DISKETTE PROGRAM
COPYRIGHT FLAGSTAFF ENGINEERING 6/21/83

INSERT 5" CP/M DISKETTE -
ENTER DRIVE (B/A) WHEN READY.?  [ENTER]

ENTER DESTINATION DOS DRIVE (A/B-G)? [C]
[ENTER]

**LISTING OF FILES IN 5" CP/M DIRECTORY**

001-TEST.ASM    0233
002-HELP.TXT    0074
003-ARCDATA.DBF 0132
004-HELP.BAK    0074

ENTER CP/M FILE FOR COPY (1-64/99=ALL) -
PRESS ENTER IF NONE? [3] [ENTER]

COPY OF #003 ARCDATA .DBF IS COMPLETED
 - 132 RECORDS WERE COPIED

**LISTING OF FILES IN 5" CP/M DIRECTORY**

001-TEST.ASM    0233
002-HELP.TXT    0074
003-ARCDATA.DBF 0132
004-HELP.BAK    0074
```

```
ENTER CP/M FILE FOR COPY (1-64/99=ALL) -
PRESS ENTER IF NONE?  [ENTER]

DO YOU WANT TO COPY FROM
ANOTHER CP/M DISKETTE (N/Y)?  [ENTER]
A>
```

DOSTOCPM

USE:

Copy a PC-DOS file to a PC CP/M-86 5 1/4" diskette file.

DESCRIPTION:

The DOSTOCPM program is designed to copy DOS files to CP/M-86 files on PC/XT/AT systems that run both PC-DOS and CP/M-86. The files are copied as is without any type of conversion.

OPERATION:

Load DOSTOCPM. On completion of the program load, a program description message will be displayed. The program will then prompt the user to insert the 5 1/4" CP/M-86 diskette into a drive and enter the DOS drive letter of the drive being used.

Insert the CP/M-86 diskette and press [A] for DOS drive A, or press [B] or [ENTER] to select DOS drive B.

The program will read the CP/M diskette directory and display a list of the directory entries as file names preceded by a file number. The program will display the file number and beginning block number that will be used when a file is copied to the CP/M diskette. The program will then prompt the user to erase the CP/M directory.

Press [Y] to erase all files on the CP/M diskette, or press [N] or [ENTER] to leave the existing CP/M files on the diskette.

The program will prompt the user to enter the DOS file name to be copied to the CP/M diskette.

Enter the file name using standard DOS syntax: Volume ID:File Name.Extension

If [ENTER] is pressed without entering a file name, the program will exit the copy operation and prompt the user to copy to another CP/M diskette. Another diskette can be loaded at this point, or the program can be ended by pressing [ENTER].

The program will copy the DOS file selected by the user to the CP/M diskette. The program will then display a message that the copy is complete, and the number of records copied. The directory of the files on the CP/M-86 diskette will be displayed and the user will be prompted to copy another DOS file to the diskette.

Enter the DOS file name to be copied, or press enter to exit the copy operation.

When the copy operation is ended, the program will prompt the user to copy to another CP/M diskette.

Press [Y] to copy to another CP/M diskette, or press [N] or enter to end the program.

DEFAULTS:

Drive Number:	[ENTER] = Drive B.
Erase Directory:	[ENTER] = No.
DOS File Name:	[ENTER] = Exit copy routine.
Continue Copy:	[ENTER] = End program.

DESTRUCTIVE/NONDESTRUCTIVE:

DOSTOCPM will not destroy data on the DOS source volume, however, IF THE TARGET FILE NAME ALREADY EXISTS ON THE CP/M-86 DIRECTORY, ALL ORIGINAL DATA IN THE CP/M-86 FILE WILL BE OVERWRITTEN AND DESTROYED BY THE COPY OPERATION.

SAMPLE RUN:

```
A>  [DOSTOCPM] [ENTER]

COPY 5" DOS TO 5" CP/M DISKETTE PROGRAM
COPYRIGHT FLAGSTAFF ENGINEERING 6/21/83

INSERT 5" CP/M DISKETTE -
ENTER DRIVE (B/A) WHEN READY.?  [ENTER]

**LISTING OF FILES IN 5" CP/M DIRECTORY**

001-TEST.ASM    0233
002-HELP.TXT    0074
003-ARCDATA.DBF 0132
004-HELP.BAK    0074

NEW FILE WILL BE #05 STARTING AT BLOCK XX
ON THE 5" CP/M DISKETTE

DO YOU WANT TO ERASE THE 5" CP/M FILE
DIRECTORY (N/Y)?  [ENTER]

ENTER DOS FILE NAME FOR COPY B:NAME.EXT -
PRESS ENTER IF NONE? [A:ABC.DOC] [ENTER]

FILE COPY IS COMPLETED -
0002 RECORDS WERE COPIED
```

```
**LISTING OF FILES IN 5" CP/M DIRECTORY**

001-TEST.ASM    0233
002-HELP.TXT    0074
003-ARCDATA.DBF 0132
004-HELP.BAK    0074
005-ABC.DOC     0002

NEW FILE WILL BE #06 STARTING AT BLOCK XX
ON THE 5" CP/M DISKETTE

DO YOU WANT TO ERASE THE 5" CP/M FILE
DIRECTORY (N/Y)?  [ENTER]

ENTER DOS FILE NAME FOR COPY B:NAME.EXT -
PRESS ENTER IF NONE? [ENTER]

DO YOU WANT TO COPY FROM
ANOTHER CP/M DISKETTE (N/Y)?  [ENTER]
A>
```

CP/M 8" DISKETTE FORMATS

Various diskette formats are used on CP/M 8" systems. The file connection programs are designed to work with both single sided and double sided diskettes formatted as single or double density.

Regardless of sides or density, 8" CP/M diskettes contain 77 cylinders. The system boot loader is located on cylinder 00 and the data is written on cylinders 01 through 74. Bad diskette tracks are assigned to alternate tracks on cylinders 75 through 76.

Data tracks are formatted with different sizes and numbers of sectors. The standard formats are given below. (Sector size and sectors-per-track numbers are given in bytes.)

DY = DENSITY
SS= SECTOR SIZE
S/T = SECTORS PER TRACK
TC = TOTAL CAPACITY
SD = SINGLE DENSITY
DD = DOUBLE DENSITY

DY	SS	S/T	TC	MACHINE TYPE
SD	128	26	242,944	Universal CP/M.
SD	256	15	284,160	Fairly common.
SD	512	8	303,104	Rare.
DD	256	26	985,088	Very Common.
DD	512	15	1,136,640	Rare.
DD	1024	8	1,212,416	Rare.

On all CP/M diskettes, cylinder 0, head 0 is always formatted as 128 byte sectors in single density. The remaining tracks on the diskette are formatted with the selected density and sector size. When the first CP/M data file is written on the diskette, the file directory entry is usually recorded starting on cylinder 2, head 0. Some systems start the directory on cylinder 1 and others use cylinder 6. Each directory contains information on the file name, the file location, and its size.

CP/M FORMAT IDENTIFICATION:

The file connection CP/M transfer programs require the user to answer various prompts on the CP/M system format of the 8" diskettes. To properly use the programs, the answers to these prompts should be known before the programs are executed. The four format prompts are:

1. Skew factor
2. Directory cylinder
3. Records per CP/M blocks
4. Blocks in the directory

These parameters are usually described in the system manual for the particular system that created the diskettes. The system manual should be used to find the correct values.

If a system manual is not available for the system that created the 8" diskette being used, the DISPLAY8 program from the Flagstaff Engineering Utility/8 diskette can be used to display various sectors of the 8" CP/M diskette.

SKEW FACTOR-

Sectors are not written to sequentially on a CP/M system diskette. Sectors on a specific track will be written to based on an offset value which is added to the sector number of the last sector used. This is referred to as Sector Skew Factor. If the skew factor for a given diskette is 6, sector 1 will be the first sector used to write data to. The next sector used will be sector 7, then 13, 19, 25, 5, 11, 17 etc., until the entire track is filled.

If the sector count results in a sector already in use, the count is incremented by one to the next sequential sector.

The standard skew factor for 128 byte single density sectors is 6. Most double density diskettes use a skew factor of 3.

Sector skew factor is difficult to determine by viewing diskette data with the DISPLAY8 program, but it can be done. The user should look for a large file that spans more then one sector. If the data at the end of the sector breaks in the middle of a string or other observable sequence, following sequential sectors may be displayed until the sector is found that contains the continuation of the data. The first sector number may then be subtracted from the second sector number to arrive at the skew factor.

DIRECTORY CYLINDER-

The CP/M diskette directory will normally appear on cylinder 1, 2 or 6. Each directory entry consists of a 32 byte entry. The first byte of the entry is 00 for an active file. The next eleven bytes of the entry is an eight byte file name followed by a three byte file type (extension). If the directory cylinder for a particular 8" CP/M diskette is unknown, it can be easily found using the DISPLAY8 program. Load DISPLAY8 and display cylinder, head and sector 01001. If a series of 32 byte directory entries are not found, then display CCHSS 02001. Again, if the directory is not found, then display 06001.

CP/M RECORDS PER BLOCK and CP/M BLOCKS IN DIRECTORY -

A CP/M record is defined as 128 bytes of data. CP/M systems define files in terms of CP/M records. CP/M diskettes are divided into physical blocks of 8, 16, 32, and 64 CP/M records.

On a single sided, single density diskette with 128 byte sectors, each sector would be the equivalent of a CP/M record. If the diskette used 8 records per block with 2 blocks in the directory, 16 sectors would be reserved for directory entries. Data files would start at the 17th sector (the beginning of the 3rd block).

In a 32 byte CP/M directory entry, position twelve through fifteen (beginning from zero) indicate the number of CP/M records used for that entry. The last 16 bytes of the directory entry indicate which blocks have been allocated for the entry. The block indicators will always be a value greater than 01 hex. Positions containing 00 are not allocated.

A large file can span several directory entries since the number of records per block limits the total number of records used by a single directory entry.

To determine the number of records per block on a CP/M diskette, display the first directory entry of a file using the program DISPLAY8. Count the number of positions (number of blocks allocated) in the last 16 bytes of the entry that contain a hex value greater than 01.

To determine the total number of records for the entry, multiply the value of position twelve in the directory entry by 128, and then add the value in position fifteen (the values displayed by DISPLAY8 are hexadecimal values and must be converted to decimal).

Divide the total number of records by the total number of blocks allocated. If the result is not a valid records-per-block value of 8, 16, 32, or 64, raise the result to the next greater records-per-block value (8.432 or 12.333 would be raised to 16).

An example CP/M entry would appear as:

```
Position  00 01 02 03 04........12....15
Hex Value 00 50 49 50 20........00....16

Position  16 17 18 19 20........29 30 31
Hex Value 1A 1B 1C 00 00........00 00 00
```

Multiply the value in position twelve (0) by 128 and then add the value in position fifteen (16 hex equals decimal value 22). The result is 22 total records. Positions 16, 17, and 18 have values greater then hex 01 so three blocks have been allocated. Divide 22 by 3, and the result is 7.333. The number is not a valid records-per-block value, so it should be raised to the next greater valid value of 8. The diskette uses 8 records per block to store data.